1. A method for forming a bottom spin valve magnetorestive sensor element comprising:

providing a substrate;

forming on the substrate a magnetoresistive-property-enhancing seed layer;

forming on said seed layer a pinning layer of antiferromagnetic material;

forming on said pinning layer a synthetic antiferromagnetic pinned (SyAP) layer, said formation further comprising:

forming on said pinning layer a second antiparallel (AP2) pinned layer of ferromagnetic material;

forming on said second antiparallel (AP2) pinned layer a non-magnetic coupling layer; and

forming on said non-magnetic coupling layer a first antiparallel (AP1) pinned layer to complete said SyAP layer;

forming on said first antiparallel (AP1) layer of said SyAP layer a non-magnetic spacer layer;

forming on said non-magnetic spacer layer a ferromagnetic free layer;

forming on said ferromagnetic free layer a double-layer capping layer, said capping layer comprising a first layer of non-magnetic material on which is formed a second layer (NOL) of specularly reflecting material;

thermally annealing said sensor element at a prescribed succession of temperatures in the presence of a corresponding sequence of external magnetic fields, establishing, thereby, the magnetizations of said free and said pinned magnetic layers.

2. The method of claim 1 wherein the magnetoresistive-property-enhancing seed layer is a layer of either NiCr or NiFeCr deposited to a thickness of between approximately 30 and 70 angstroms.

3. The method of claim 1 wherein the antiferromagnetic pinning layer is a layer of antiferromagnetic material chosen from the group consisting of MnPt, IrMn, NiMn and MnPdPt.

4. The method of claim 3 wherein the antiferromagnetic pinning layer is a layer of MnPt formed to a thickness of between approximately 80 and 250 angstroms.

5. The method of claim 1 wherein the second antiparallel pinned layer (AP2) is a layer of ferromagnetic material chosen from the group consisting of CoFe, NiFe and CoFeNi.

6. The method of claim 5 wherein the second antiparallel pinned layer (AP2) is a layer of CoFe formed to a thickness of between approximately 10 and 25 angstroms.

7. The method of claim 1 wherein the non-magnetic coupling layer is a layer of non-magnetic material chosen from the group consisting of Ru, Rh and Re.

8. The method of claim 7 wherein the non-magnetic coupling layer is a layer of Ru formed to a thickness of between approximately 3 and 9 angstroms.

9. The method of claim 1 wherein the first antiparallel pinned layer (AP1) is a layer of ferromagnetic material chosen from the group consisting of CoFe, NiFe and CoFeNi.

10. The method of claim 9 wherein the first antiparallel pinned layer (AP1) is a layer of CoFe formed to a thickness of between approximately 10 and 30 angstroms.

11. The method of claim 1 wherein the non-magnetic spacer layer is a layer chosen from the group consisting of Cu, Ag and Au.

12. The method of claim 11 wherein the non-magnetic spacer layer is a layer of Cu of thickness between approximately 8 and 30 angstroms.

13. The method of claim 12 wherein the non-magnetic spacer layer is a layer of Cu of thickness approximately 18 angstroms.

14. The method of claim 12 wherein the non-magnetic spacer layer is a layer of Cu of thickness approximately 19 angstroms.

15. The method of claim 1 wherein the ferromagnetic free layer is a layer of ferromagnetic material chosen from the group consisting of CoFe, NiFe, CoFeNi, CoFe/NiFe.

16. The method of claim 15 wherein the ferromagnetic free layer is a layer of CoFe formed to a thickness of between approximately 10 and 60 angstroms.

17. The method of claim 1 wherein the non-magnetic material layer of the capping layer is a layer of non-magnetic material chosen from the group consisting of Cu, Ag, Au, Rh and Ru.

18. The method of claim 17 wherein the non-magnetic material layer of the capping layer is a layer of Cu formed to a thickness of between approximately 0 and 20 angstroms.

19. The method of claim 1 wherein the specularly reflecting layer of the capping layer is a layer of FeTaO formed to a thickness of between approximately 5 and 40 angstroms.

20. The method of claim 19 wherein the specularly reflecting layer of FeTaO is formed by an oxidation process applied to a layer of FeTa deposited on said non-magnetic material layer to a thickness of between approximately 3 and 30 angstroms.

21. The method of claim 20 wherein said layer of deposited FeTa is a layer which is approximately 95% Fe by number of atoms and approximately 5% Ta by number of atoms.

22. The method of claim 21 wherein said oxidation process is carried out in a PM5 TIM module in which there is supplied molecular oxygen at a flow rate of between approximately 5 and 50 sccm, a pressure of between approximately 0.05 and 0.5 mTorr for a time duration of between approximately 9 and 11 seconds, but where approximately 10 seconds is preferred.

23. The method of claim 1 wherein the specularly reflecting capping layer is a layer of oxidized Fe or oxidized $(Fe_{65}Co_{35})_{97}V_3$ formed to a thickness of between approximately 5 and 40 angstroms.

24. The method of claim 23 wherein said oxidation process is carried out in a PM5 TIM module in which there is supplied molecular oxygen at a flow rate of between approximately 5 and 50 sccm, a pressure of between approximately 0.05 and 0.5 mTorr for a time duration of between approximately 9 and 11 seconds, but where approximately 10 seconds is preferred.

25. The method of claim 1 wherein the annealing process comprises a first thermal anneal at a temperature of between approximately 240^0 and 300^0 C, but where 270^0 C is preferred, in an external longitudinal magnetic field of between approximately 0.9 and

1.1 kOe, but where approximately 1 kOe is preferred, for a time of between approximately 9 and 11 min., but where approximately 10 min. is preferred, to magnetize the free layer; followed by a second thermal anneal at a temperature of between approximately 240^0 and 300^0 C, but where 270^0 C is preferred, in an external magnetic field of between approximately 7 and 9 kOe, but where 8 kOe is preferred, said field directed transversely to that of the first thermal anneal, for a time of between approximately 2 and 4 hours, but where approximately 3 hours is preferred, to magnetize the pinned layer; followed by a third thermal anneal at a temperature of between approximately 190^0 and 240^0 C, but where approximately 210^0 C is preferred, in an external longitudinal magnetic field of between approximately 180 and 220 Oe, but where 200 Oe is preferred, in the same direction as that of the first anneal, for a time of between approximately 1.5 and 2.5 hours, but where approximately 2 hours is preferred, to magnetize the free layer.

26. A method for forming a bottom spin valve magnetorestive sensor element comprising:

providing a substrate;

forming on the substrate a magnetoresistive-property-enhancing seed layer;

forming on said seed layer a pinning layer of antiferromagnetic material;

forming on said pinning layer a synthetic antiferromagnetic pinned (SyAP) layer, said formation further comprising:

forming on said pinning layer a second antiparallel (AP2) pinned layer of ferromagnetic material;

forming on said second antiparallel (AP2) pinned layer a non-magnetic coupling layer; and

forming on said non-magnetic coupling layer a first antiparallel (AP1) pinned layer to complete said SyAP layer;

forming on said first antiparallel (AP1) layer of said SyAP layer a non-magnetic spacer layer;

forming on said non-magnetic spacer layer a ferromagnetic free layer;

forming on said ferromagnetic free layer a capping layer (NOL) of specularly reflecting material;

thermally annealing said sensor element at a prescribed succession of temperatures in the presence of a corresponding sequence of external magnetic fields, establishing, thereby, the magnetizations of said free and said pinned magnetic layers.

27. The method of claim 26 wherein the seed layer is a layer of either NiCr or NiFeCr deposited to a thickness of between approximately 30 and 70 angstroms.

28. The method of claim 26 wherein the antiferromagnetic pinning layer is a layer of antiferromagnetic material chosen from the group consisting of MnPt IrMn, NiMn and MnPdPt.

29. The method of claim 28 wherein the antiferromagnetic pinning layer is a layer of MnPt formed to a thickness of between approximately 80 and 250 angstroms.

30. The method of claim 26 wherein the second antiparallel pinned layer (AP2) is a layer of ferromagnetic material chosen from the group consisting of CoFe, NiFe and CoFeNi.

31. The method of claim 30 wherein the second antiparallel pinned layer (AP2) is a layer of CoFe formed to a thickness of between approximately 10 and 25 angstroms.

32. The method of claim 26 wherein the second antiparallel pinned layer (AP2) is a triply laminated layer comprising a first and a second ferromagnetic layer separated by a non-magnetic spacer layer.

33. The method of claim 32 wherein said first and second ferromagnetic layers are layers of ferromagnetic material chosen from the group consisting of CoFe, NiFe and CoFeNi.

34. The method of claim 33 wherein said first and second ferromagnetic layers are layers of CoFe, wherein each layer is formed to a thickness of between approximately 5 and 15 angstroms.

35. The method of claim 32 wherein said non-magnetic spacer layer is a layer of non-magnetic material chosen from the group consisting of Ta, NiCr and NiFeCr.

36. The method of claim 35 wherein said non-magnetic spacer layer is a layer of Ta deposited to a thickness of between approximately 0.5 and 5 angstroms.

37. The method of claim 26 wherein said non-magnetic coupling layer is a layer of non-magnetic material chosen from the group consisting of Ru, Rh and Re.

38. The method of claim 37 wherein said non-magnetic coupling layer is a layer of Ru formed to a thickness of between approximately 3 and 9 angstroms.

39. The method of claim 26 wherein said first antiparallel pinned layer (AP1) is a layer of ferromagnetic material chosen from the group consisting of CoFe, NiFe and CoFeNi.

40. The method of claim 39 wherein said first antiparallel pinned layer (AP1) is a layer of CoFe formed to a thickness of between approximately 10 and 30 angstroms.

41. The method of claim 26 wherein said non-magnetic spacer layer is a layer chosen from the group consisting of Cu, Ag and Au.

42. The method of claim 41 wherein said non-magnetic spacer layer is a layer of Cu of thickness between approximately 8 and 30 angstroms.

43. The method of claim 42 wherein said non-magnetic spacer layer is a layer of Cu of thickness approximately 19 angstroms.

44. The method of claim 26 wherein said specularly reflecting capping layer is a layer of FeTaO formed to a thickness of between approximately 5 and 40 angstroms.

45. A bottom spin valve magnetorestive sensor element comprising:

a substrate;

a magnetoresistive-property-enhancing seed layer formed on said substrate;

a pinning layer of antiferromagnetic material formed on said seed layer;

a synthetic antiferromagnetic pinned (SyAP) layer formed on said pinning layer, said SyAP layer further comprising:

a second antiparallel (AP2) pinned layer of ferromagnetic material formed on said pinning layer;

a non-magnetic coupling layer formed on said second antiparallel (AP2) pinned layer; and

a first antiparallel (AP1) pinned layer formed on said non-magnetic coupling layer to complete said SyAP layer;

a non-magnetic spacer layer formed on said first antiparallel (AP1) layer of said SyAP layer;

a ferromagnetic free layer formed on said non-magnetic spacer layer;

a double-layer capping layer formed on said ferromagnetic free layer, said capping layer comprising a first layer of non-magnetic material on which is formed a second layer (NOL) of specularly reflecting material; and

said free layer being longitudinally magnetized and said pinned magnetic layers being magnetized transversely to said free layer.

46. The sensor element of claim 45 wherein said magnetoresistive-property-enhancing seed layer is a layer of either NiCr or NiFeCr deposited to a thickness of between approximately 30 and 70 angstroms.

47. The sensor element of claim 45 wherein the antiferromagnetic pinning layer is a layer of antiferromagnetic material chosen from the group consisting of MnPt, IrMn, MnPtPd and NiMn.

48. The sensor element of claim 47 wherein the antiferromagnetic pinning layer is a layer of MnPt formed to a thickness of between approximately 80 and 250 angstroms.

49. The sensor element of claim 45 wherein the second antiparallel pinned layer (AP2) is a layer of ferromagnetic material chosen from the group consisting of CoFe NiFe and NiFeCo.

50. The sensor element of claim 49 wherein the second antiparallel pinned layer (AP2) is a layer of CoFe formed to a thickness of between approximately 10 and 25 angstroms.

51. The sensor element of claim 45 wherein the non-magnetic coupling layer is a layer of non-magnetic material chosen from the group consisting of Ru, Rh and Re.

52. The sensor element of claim 51 wherein the non-magnetic coupling layer is a layer of Ru formed to a thickness of between approximately 3 and 9 angstroms.

53. The sensor element of claim 45 wherein the first antiparallel pinned layer (AP1) is a layer of ferromagnetic material chosen from the group consisting of CoFe, NiFe and CoFeNi.

54. The sensor element of claim 53 wherein the first antiparallel pinned layer (AP1) is a layer of CoFe formed to a thickness of between approximately 10 and 30 angstroms.

55. The sensor element of claim 45 wherein the non-magnetic spacer layer is a layer chosen from the group consisting of Cu, Ag and Au.

56. The sensor element of claim 55 wherein the non-magnetic spacer layer is a layer of Cu of thickness between approximately 8 and 30 angstroms.

57. The sensor element of claim 55 wherein the non-magnetic spacer layer is a layer of Cu of thickness approximately 18 angstroms.

58. The sensor element of claim 55 wherein the non-magnetic spacer layer is a layer of Cu of thickness approximately 19 angstroms.

59. The sensor element of claim 45 wherein the ferromagnetic free layer is a layer of ferromagnetic material chosen from the group consisting of CoFe, NiFe, CoFeNi and CoFe/NiFe.

60. The sensor element of claim 59 wherein the ferromagnetic free layer is a layer of CoFe formed to a thickness of between approximately 10 and 60 angstroms.

61. The sensor element of claim 45 wherein the non-magnetic material layer of the capping layer is a layer of non-magnetic material chosen from the group consisting of Cu, Ag, Au, Rh and Ru.

62. The sensor element of claim 61 wherein the non-magnetic material layer of the capping layer is a layer of Cu formed to a thickness of between approximately 0 and 20 angstroms.

63. The sensor element of claim 45 wherein the specularly reflecting layer of the capping layer is a layer of FeTaO of between approximately 5 and 40 angstroms thickness.

64. The sensor element of claim 45 wherein the specularly reflecting layer of the capping layer is a layer of oxidized Fe or oxidized $(Fe_{65}Co_{35})_{97}V_3$ of between approximately 5 and 40 angstroms thickness.

65. A bottom spin valve magnetorestive sensor element comprising:

a substrate;

a magnetoresistive-property-enhancing seed layer formed on the substrate;

a pinning layer of antiferromagnetic material formed on said seed layer;

a synthetic antiferromagnetic pinned (SyAP) layer formed on said pinning layer, said SyAP layer further comprising:

a second antiparallel (AP2) pinned layer of ferromagnetic material formed on said pinning layer;

a non-magnetic coupling layer formed on said second antiparallel (AP2) pinned layer; and

a first antiparallel (AP1) pinned layer formed on said non-magnetic coupling layer to complete said SyAP layer;

a non-magnetic spacer layer formed on said first antiparallel (AP1) layer of said SyAP layer;

a ferromagnetic free layer formed on said non-magnetic spacer layer;

a capping layer (NOL) of specularly reflecting material formed on said ferromagnetic free layer; and

said free layer being longitudinally magnetized and said pinned magnetic layers being magnetized transversely to said free layer.

66. The sensor of claim 65 wherein said magnetoresistive-property-enhancing seed layer is a layer of either NiCr or NiFeCr deposited to a thickness of between approximately 30 and 70 angstroms.

67. The sensor of claim 65 wherein said antiferromagnetic pinning layer is a layer of antiferromagnetic material chosen from the group consisting of MnPt, IrMn, NiMn and MnPdPt.

68. The sensor of claim 67 wherein said antiferromagnetic pinning layer is a layer of MnPt formed to a thickness of between approximately 30 and 70 angstroms.

69. The sensor of claim 65 wherein said second antiparallel pinned layer (AP2) is a layer of ferromagnetic material chosen from the group consisting of CoFe, NiFe and CoFeNi.

70. The sensor of claim 69 wherein the second antiparallel pinned layer (AP2) is a layer of CoFe formed to a thickness of between approximately 10 and 25 angstroms.

71. The sensor of claim 65 wherein said second antiparallel pinned layer (AP2) is a triply laminated layer comprising a first and a second ferromagnetic layer separated by a non-magnetic spacer layer.

72. The sensor of claim 71 wherein said first and second ferromagnetic layers are layers of ferromagnetic material chosen from the group consisting of CoFe, NiFe and CoFeNi.

73. The sensor of claim 72 wherein said first and second ferromagnetic layers are layers of CoFe, wherein each layer is formed to a thickness of between approximately 5 and 15 angstroms.

74. The sensor of claim 71 wherein said non-magnetic spacer layer is a layer of non-magnetic material chosen from the group consisting of Ta, NiCr and NiFeCr.

75. The sensor of claim 74 wherein said non-magnetic spacer layer is a layer of Ta deposited to a thickness of between approximately 0.5 and 5 angstroms.

76. The sensor of claim 65 wherein said non-magnetic coupling layer is a layer of non-magnetic material chosen from the group consisting of Ru, Rh or Re.

77. The sensor of claim 76 wherein said non-magnetic coupling layer is a layer of Ru formed to a thickness of between approximately 3 and 9 angstroms.

78. The sensor of claim 65 wherein said first antiparallel pinned layer (AP1) is a layer of ferromagnetic material chosen from the group consisting of CoFe, NiFe and CoFeNi.

79. The sensor of claim 78 wherein said first antiparallel pinned layer (AP1) is a layer of CoFe formed to a thickness of between approximately 10 and 30 angstroms.

80. The sensor of claim 65 wherein said non-magnetic spacer layer is a layer chosen from the group consisting of Cu, Ag and Au.

81. The sensor of claim 80 wherein said non-magnetic spacer layer is a layer of Cu of thickness between approximately 8 and 30 angstroms.

82. The sensor of claim 81 wherein said non-magnetic spacer layer is a layer of Cu of thickness approximately 19 angstroms.

83. The sensor of claim 65 wherein said specularly reflecting capping layer is a layer of FeTaO formed to a thickness of between approximately 5 and 40 angstroms.